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ABSTRACT

Nigeria is faced with developmental problems, most of which can be solved with the aid of scientific and technological information contained in books, journals and patents, largely obtainable from the advanced countries. There are academic and research institutions generating information that could enhance the economic development of the country but they are not sharing information. A few of them have computerized and they can form the nucleus of some national networks. The Federal Ministry of Science and Technology has commissioned a science and technology databank project to bring together the databases in the individual research institutes into a network. The university libraries are currently receiving assistance from the World Bank and it is hoped that part of the aid will be used to produce a networked computerized union catalog. Telephone lines in Nigeria are inadequate qualitatively and quantitatively. Digitalization of the lines is in the progress. These are as yet no public-switched data lines with packet switching supports to make online information cheap and affordable to researchers. Dial-up access to the Internet is not yet possible and has to be done through service providers outside the country. (Author)

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Online Scientific and Technological Information in Nigeria: Prospects and Possibilities

By:

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Online scientific and technological information in Nigeria: prospects and possibilities

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Abstract: *Nigeria is faced with developmental problems, most of which can be solved with the aid of scientific and technological information contained in books, journals and patents, largely obtainable from the advanced countries. There are academic and research institutions generating information that could enhance the economic development of the country but they are not sharing information. A few of them have computerised and they can form the nucleus of some national networks. The Federal Ministry of Science and Technology has commissioned a science and technology databank project to bring together the databases in the individual research institutes into a network. The university libraries are currently receiving assistance from the World Bank and it is hoped that part of the aid will be used to produce a networked computerised union catalogue. Telephone lines in Nigeria are inadequate qualitatively and quantitatively. Digitalisation of the lines is in progress. There are as yet no public-switched data lines with packet switching supports to make online information cheap and affordable to researchers. Dial-up access to the Internet is not yet possible and has to be done through service providers outside the country.*

Keywords: Nigeria, telecommunications, computer networking, research and development, online information, Internet, science and technology, CD-ROM

1. Introduction

Nigeria is a technologically backward country perpetually encumbered with those social, and economic problems usually associated with technological backwardness. With a population of over eighty million, the country needs all the technology and technical know-how as well as show-how it can get to be able to attend to the myriad problems facing it. The needed technical knowledge must come through scientific and technical information (STI) either indigenously developed and locally available or acquired from external sources. It is the experience of Nigeria, like the other underdeveloped countries, that in spite of the R&D projects undertaken in the universities and research institutes, most of this STI comes from the developed countries through the printed media such as books, journals, patents, standards and so forth.

It will be interesting to know the number of foreign scientific and technical (S&T) journals to which Nigerian institutions used to subscribe. Unfortunately this author has not been able to acquire this knowledge and the figures available at the time of writing as contained in published National Union Catalogues are too old. Suffice to say that the universities, polytechnics and research institutes subscribed to thousands foreign journal titles in S&T. Ditto for books, patents, standards and other publications.

But that was yesterday, when there was an oil boom and Nigeria enjoyed a favourable foreign exchange reserve position. Today, with the country's foreign debt standing at an all-time high it has become impossible for all but a few of the institutions either to subscribe to foreign journals or to buy foreign books. This has been the case for many years now and it is not uncommon to find foreign journals published seven or more years ago still being displayed as the current issues in some Nigerian libraries. However, some libraries are in a privileged position and are able to be up-to-date in their collections. It is therefore reasonable to advocate resource sharing as the only way of solving Nigeria's problem of scarcity of literature in the area of S&T.

2. Sources of STI in Nigeria

STI information is indisputably one of the prerequisites that Nigeria needs in its struggles to become recognised internationally as a developed country. In recognition and admission of this crucial fact universities of technology, polytechnics and research institutes have been established to provide information that can be used to solve the country's problems.

IR056673

As of now there are in the country 36 universities, 20 polytechnics and 24 research institutes, where research and development work is done and technological breakthroughs and inventions are made.

3. Physical and environmental handicaps

These institutions are separated from each other by long distances, cut off from each other by bad roads, poor postal services, bad telecommunication lines and poor transportation services. Between them there is a wide information gap created by these infrastructural handicaps which makes operation of traditional library cooperation schemes difficult and almost beyond human endurance. Consequently, these institutes are not exchanging data or sharing resources among themselves. Yet a means must be found through which the few internally available, up-to-date information materials possessed by the privileged few can be jointly used by all who are interested, as and when desired. The means is to be found in computerisation and networking.

4. Computers to the rescue

In spite of the generally poor state of physical, environmental and infrastructural facilities, some institutions are preparing to go into computerisation, some are in the initial stage of computerisation and some have fully computerised their operations. Among them are the International Institute for Tropical Agriculture (IITA), Nigerian Institute of International Affairs (NIIA), Federal Institute of Industrial Research, Oshodi (FIIRO), National Office for Technology Acquisition and Promotion (NOTAP), Raw Materials Research Development Council (RMRDC), National Institute for Pharmaceutical Research and Development (NIPRD) and National Research Institute for Chemical Technology (NRICT).

The university libraries which for many years were unable to purchase books due to scarcity of funds have been enjoying some assistance from the World Bank under which their book requirements are being satisfied. The cataloguing of these books in the individual libraries is done with the computer using a common software called TINLIB. With this, a computerised union catalogue of university libraries' book holdings should emerge and the university libraries will be able to gain online access to each others' catalogues, if and when they are networked.

5. Network(s) development

The essence of linking up computers in networks is to enhance data exchange and information resource sharing among corporate bodies and individuals, nationally and internationally. In order to gain maximum benefit from such cooperation it behoves all participating entities to contribute to the pool. This means that any participant in the arrangement is expected to possess its own local resources. The proverb 'charity begins at home' is very apt here. Nigeria therefore is obliged to build its own national networks of computers in which will be resident the databases of scientific/technical, statistical, economic and educational information which have been produced locally by the appropriate institutions.

In the area of STI very little is being done towards networking of computers, although some of the universities and research institutes have been producing local databases. At FIIRO, different databases have been produced relating to the following:

- on-going R&D projects;
- production raw materials inputs;
- production process techniques and technologies;
- machinery and equipment.

At RMRDC, databases have been produced on Nigerian raw materials availability and processing. NOTAP has databases on patents and patented technologies. These three organisations have some common grounds of activities; they were within each other's reach in Lagos before recently RMRDC moved to Abuja. But ironically, the three are informationally as far apart as they are geographically near. It is heartening however to note that the Honourable Minister of Science and Technology has observed this and official action is being taken to rectify the situation.

6. Some of the existing network types

IITA provides the best case of computer networking and online communication among institutions of its type in Nigeria. Workstations are linked into LANs which are further linked to form a CAN (Campus Area Network) using fibre-optic cables. A few standalone workstations outside the campus are linked to the network with radio waves using a technique in which an external antenna is pointed in the direction of the server to be connected. For its international communication IITA uses Internet e-mail. The software used is Novell network version 3.12 and it is the software that builds up the servers.

NACETEM (National Centre for Technology Management) in Obafemi Awolowo University, Ile-Ife uses coaxial cable for its network within the university.

ICTP (International Centre for Theoretical Physics) is executing a LAN project at the same place using radio waves within the university. It is planned to link up the universities in the country and to link up with the Internet via a gateway in Italy.

FMST (Federal Ministry of Science and Technology) has embarked on a project to network all of the research institutes under it and to connect them to a server to be located in the office of the Honourable Minister in Abuja, the new Federal Capital.

7. CD-ROM use in Nigeria

Another computer device that is being used in some Nigerian institutions to make good the shortcomings in information supply is the CD-ROM. Due to lack of funds to subscribe to the databases in host computers in Europe, USA and other countries, and due also to the lack of the telecommunications facilities required for effective link-up with these databases, CD-ROMs are being resorted to as a compromise solution to, and as an alternative method of, gaining access to foreign databases.

The CD-ROM stocks of individual libraries are appropriately geared towards the subject specialisation of their respective parent institutions. Thus we have at NOTAP a CD-ROM on European and world patents. At IITA there are more than 25 CD-ROM databases covering agriculture and related sciences. FIIRO can boast a number of CD-ROMs dealing with science and technology generally and process technologies specifically.

The importance of CD-ROMs in Nigeria stems from two considerations. Firstly they have brought the otherwise inaccessible foreign databases (some of them) to the doorsteps of Nigeria. Secondly they have helped to actualise the idea of information resource sharing envisaged when some institutions embarked on computerisation, because by their compactness they lend themselves to interlending more than diskettes.

Information retrieval from these CD-ROM databases is done in the batch mode in all the libraries, as networking environments for online information retrieval from them are yet to be created. IITA is in the forefront in information computerisation in Nigeria and it plans to have CD-ROM in a network environment. This institute is therefore expected to do online information retrieval from CD-ROM in the near future.

8. Impediments to networking and online information in Nigeria

The biggest factor militating against networking and online information in Nigeria is the telephone line. Its supply is quantitatively inadequate as only a small percentage (below 5%) of the population has access to the telephone (Ref 1). Its transmission quality is generally poor as most of the lines are still analogue. Rental and call charges are prohibitively high and beyond what most middle class people in research and academics can afford.

8.1. Other problems

Computerisation together with its other technical dimensions is an expensive undertaking requiring huge sums of money to begin and to keep going. With most of its hardware and software produced outside Nigeria, payment for its cost inevitably has to be made in foreign exchange. This poses a big problem for successive governments and it will take an administration with deep faith in the value of information to have the *political will* to spend the much money that is required.

Funds scarcity is another problem. Nigeria is a debtor country with its foreign reserve deficit currently running at an all-time high. Under these circumstances it is difficult for the government to commit the country's lean foreign exchange earnings to make the Internet accessible to Nigerians, especially if the political will and the conviction is lacking as it seems to be.

9. Online telecommunication facilities available in Nigeria

The official provider of telecommunication facilities in Nigeria is NITEL (Nigerian Telecommunications PLC). It is being gradually converted into a private company and in pursuance of this some of its services are being transferred to commercial companies known as service providers. The following are the NITEL services available through service providers:

- *Leased line*. Voice or data lines can be leased. The cost depends on the baud rating but it is known to be high and beyond what the academic and research institutions can afford. It is therefore the exclusive preserve of commercial houses, especially the multi-national companies. It operates on a point-to-point basis and can be used for both local and international online access. The analogue leased line can presently support a maximum speed of 28.8 kb/s. Its digital counterpart can support various speeds varying from 64 kb/s, 2 Mb/s, 8 Mb/s and 34 Mb/s;
- *Public telephone line*. This is the least attractive on account of the poor quality transmission caused by

noise and distortion. In order to use it for extra-territorial access it needs to be fitted with IDD (International Direct Dialling) support;

- *Microwave link*. Online information can be achieved through radio transmissions. Instead of the telephone serving as the medium of communication, high quality radio microwaves can be used. In order to connect long distances in a wide area network, repeaters or signal boosters are installed as a pass-it-on device from origin to destination;
- *VSAT (Very Small Aperture Terminal)*. This is a satellite service;
- *Electronic mail*. This is offered through the Internet and is being increasingly used by universities and research institutes;
- *Packet switching*. NITEL has just announced the availability of a packet switching service. This service is for leased line users to enable them to access multi-points instead of the point-to-point. As more and more telephone lines are digitised, packet switching will be brought to the public telephone domain and Nigeria will then have public switched data lines (PSDL).

It is apparent from the above that public switched data lines (PSDL) are not yet provided in Nigeria. The existing public telephone lines do not have packet switching support to make possible multiple use and cost sharing among users, as happens in the advanced countries. As a result the cost of online communication is still prohibitively high and beyond what scientists and researchers or even their institutions can afford.

10. Internet

It is not yet possible for Nigerians to gain dial-up access to the Internet since there is no node or gateway in Nigeria presently. The practice now is for those desiring access to go via a node in any of the advanced countries. Efforts are however being made to get Nigeria to hook onto the Internet in the not too distant future. In fact there is a movement towards this, spearheaded by a group known as the Nigerian Internet Group (NIG). The Nigerian government has commissioned a survey to find out the desirability or otherwise of putting Nigeria on the Internet.

11. Conclusion

Online transmission of information is still in its infancy in Nigeria and not much has been done to warrant international attention. Its use for business in the private sector is restricted as only the banks, airlines, oil companies and other multi-nationals can afford the exorbitant costs of leased lines. Its use in the universities and research institutes is prohibited by lack of funds. Of the Nigerian institutions that have computerised and networked, none has been fully funded locally and all invariably were established with foreign assistance, usually from international and inter-governmental organisations.

The problem of financing computerisation and networking in Nigerian public institutions and the problem of providing the required infrastructural facilities such as public switched data lines, Internet gateways and nodes to actualise online information are attitudinal problems, born of poor understanding of the importance of information and resulting in the low priority accorded to it in our order of things. It takes a government with vision and with the right attitude to information to build the kind of electronic infrastructural backbone like the Internet, which now supports online information in the advanced countries, for colossal sums of money. It is not for lack of money therefore but rather for lack of interest and understanding that Nigeria lags behind in this laudable global competition on the information superhighway, where knowledge and experiences of people scattered all over the world are brought together for mutual sharing.

The universities and the research institutes on their part do not appear to be doing enough in documenting their outputs and disseminating them in the modern media for local and wide area consumption. Their libraries and information units need to rise to the challenges of modern methods of information processing by eradicating computer illiteracy among their professional staff, and additionally recruiting computer experts in programming/systems analysis and data processing. Information scientists to do document scanning and analysis, indexing, abstracting and keywording are also lacking in Nigerian universities and research institutes. Without the coming together of telecommunications and computer technologies there would have been no information technology. It can therefore be said prophetically that without massive introduction and employment of the above experts in universities and research institutes, there will be nothing on which to base networking and online information.

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